IN THE CIRCUIT COURT OF THE 11TH

JUDICIAL CIRCUIT IN AND FOR DADE COUNTY, FLORIDA

GENERAL JURISDICTION DIVISION

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HOWARD A. ENGLE, M.D., et al.,:

Plaintiffs, :

v. : CASE NO.:94-08273 CA(20)

RJ REYNOLDS TOBACCO COMPANY, :

et al., :

Defendants. :

- - - - - - - - - - - - - - - - - X

COPY

Telephone deposition of DAVID E. TOWNSEND, PH.D.

(Taken by Plaintiffs)

Winston-Salem, North Carolina

June 2, 1998

Reported by: Andrea L. Nobrega

Court Reporter

Notary Public

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Telephone deposition of DAVID E. TOWNSEND, PH.D., taken by the Plaintiffs, at 200 West Second Street, Winston-Salem, North Carolina, on the 2nd day of June, 1998 at 10:10 a.m., before Andrea L. Nobrega, Court Reporter and Notary Public.

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P R O C E E D I N G S

Whereupon, DAVID E. TOWNSEND, PH.D., having been duly sworn, was examined and testified as follows:

EXAMINATION BY COUNSEL FOR PLAINTIFFS

BY MR. HOAG:

Q. State your name for the record.

A. David Townsend.

Q. I deposed you previously in the Engle case, correct?

A. That's correct.

Q. You know I am John Hoag?

A. Yes.

Q. I heard your name before and now you are back to answer some additional questions related to the Engle case, correct?

A. That's right.

Q. Have you reviewed any additional documents since the last Engle deposition was taken?

A. Yes, I have reviewed a number of documents.

Q. Are they in addition to documents you had reviewed at the time you see -- of the first Engle deposition?

A. There are some additional documents.

Q. What, if anything, did you do to locate these documents?

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A. I think there were a number of things, including going through my files, going through the library, actually getting some of my staff members to go through some documents, as well as getting some of the attorneys to do a search of the library.

Q. Which attorneys did a search of the library?

A. An attorney from Womble, Carlyle.

Q. Do you know who that was?

A. Chris Kreiner.

Q. Was he doing this under someone's direction?

A. He was doing it to support me, actually.

Q. Did you instruct him to do it?

A. We had discussions about document production for the purpose of this deposition, and as a result of that discussion, he agreed to do that.

Q. And you had those discussions after the first Engle deposition, is that correct?

A. That's correct.

Q. How soon after the first Engle deposition did you have those discussions?

A. I don't recall exactly. I would say probably a couple months.

Q. When you say he did a search of the

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library, what library are you referring to?

A. The RJ Reynolds research and development library.

Q. The RJ Reynolds research and development library, what does that have in it?

A. It has internal documents and external documents.

Q. And when you say "internal documents," what do you mean?

A. Internal documents are documents that contain information that is produced by scientists at RJ Reynolds.

Q. What are external documents?

A. External documents are documents produced by people outside of RJ Reynolds. Some may be in the public domain as published scientific literature. Others may be reports, other information.

Q. These new documents that you provided to Stanley Rosenblatt, P.A. recently, are those all internal documents?

A. I believe the collection of documents that I provided to you is a combination of internal documents as well as a list of external documents that I will use if I am called to trial in the Engle case.

Q. Of those internal documents, have any of

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them been published? Other than provided during litigation, have any of them been published?

A. Well, I think in a general sense a lot of the information that we produce at Reynolds is published in the scientific literature. So as a general course of matter I would say yes. We could certainly go through each specific document and decide whether that information was published or not.

Q. And a lot of it is not published, right?

A. I would say a good bit of it is not published because some of it is competitively sensitive.

Q. Is that in your opinion the only reason information is not published because it's competitively sensitive?

A. No, I think it's a little more complicated than that. I think any good scientist publishes information in the scientific literature, the peer reviewed literature if it's not competitively sensitive and if it adds to the scientific knowledge. Peer reviewed journals generally don't accept information or accept papers for publication if that information is already known to scientists.

Q. Scientists at RJR have to get permission to publish something in the internal domain?

A. We have an internal peer review process.

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Q. How long has that been in place?

A. As long as I can remember at Reynolds.

Q. Has it changed at all in the last few years or has it been pretty much the same as it's always been?

A. In the last few years it's not changed at all.

Q. You said you also have staff members go through the documents?

A. I had staff members go through some files looking for specific documents that, as I said, if I am called in Engle I will use in my direct testimony.

Q. Which staff members did you have go through the documents?

A. The primary staff member was Ms. Leslie Lewis, who is the master scientist in the research and development department.

Q. Did you instruct her to do this?

A. Yes, I did.

Q. What did you instruct her to do specifically?

A. Specifically to go back and look at certain documents in the area of ammonia and pH.

Q. And when you say look at them, was she to do anything more than look at them?

A. She was to give me a list that I would then

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review.

Q. Was the list supposed to be all inclusive?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Well, I think not all inclusive. I think what I was looking for is specific documents that speak to the ammonia and pH theories, certainly not all inclusive to the broader issue of ammonia and pH and ammonia or taste modifications, certainly not all inclusive.

BY MR. HOAG:

Q. So she was selective in the documents that she listed that mentioned ammonia and pH?

A. She was what?

Q. She was selective in selecting documents to provide you a list as far as documents that discussed in any way ammonia and pH?

A. I don't think selective is the right word. I think her search was narrowed to those documents that speak specifically to pH, ammoniation and the theories of pH. So it was a narrowed search as opposed to the broader search.

Q. Did she look for any marketing documents related to marketing cigarettes that contained ammonia or higher pH levels?

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A. No, I can't recall any.

Q. You can't recall whether she looked for any or you can't recall seeing any at all?

A. I can't recall that she looked for any. We were looking at internal research and development documents that speak to the pH theories.

Q. Did you look for any marketing documents at all?

A. No, I didn't.

Q. Are you relying on any marketing documents?

A. Let me think, no.

Q. Do you know whether or not at some point RJR added additional amounts of ammonia in response to what was perceived to be happening with the Marlboro brand and the Philip Morris brand?

MR. LATHAM: Object to the form of the question.

THE WITNESS: There were a number of theories about ammoniation and Marlboro and pH. There were a number of experiments that were conducted at Reynolds and also outside of Reynolds that tried to address those theories by looking at ammonia addition and looking at ammonia addition in several different ways.

So there were experiments, and of course,

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ammonia has been used in commercial products, but the end result is not an affect on pH.

BY MR. HOAG:

Q. That wasn't my question.

A. Okay, sorry.

MR. HOAG: Could you read the question back, please.

(The record was read.)

BY MR. HOAG:

Q. By that I mean, just to clarify, whether they ever added additional amounts of ammonia to commercially sold cigarettes in response to what was perceived to be occurring from the addition of ammonia in Marlboro and other Philip Morris cigarettes? That's regardless of whether or not the research bore out what they believed was occurring because of the addition of ammonia. Can you answer the question now?

A. I think I understand. I think there were several people at Reynolds who believed adding ammonia would increase pH of the smoke and urged the adoption of it in commercial products. There were also researchers who had been evaluating the effects of ammoniation on the smoke flavor and the formation of flavorful compounds as a result of ammoniation. There were different theories and certainly there were people at

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Reynolds who urged the adoption of ammoniation for increased pH.

In addition, there were people at Reynolds who urged the adoption of ammoniation for increased flavor and certainly for some people, both of those were motivations.

Q. Still not my question. Regardless of the reasons, did they actually do it in response to what the perceived effect of the ammonia was on the Marlboro brand and other Philip Morris brands?

MR. LATHAM: Object to the form of the question.

THE WITNESS: If your question is were commercial products actually ammoniated, the answer to your question is of course.

BY MR. HOAG:

Q. This was done in response to the perceived effects ammoniation was having on the Marlboro brand and other Philip Morris products, correct?

A. I think the conclusion that Marlboro was using ammoniated tobaccos was a major motivater in RJ Reynolds using ammoniation.

Q. And when did they start to use ammoniation in response to what they perceived to be occurring with the Marlboro cigarette?

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A. I believe the first commercial RJ Reynolds product was Camel, which was -- the first ammoniated RJR product was Camel, which was ammoniated first commercially in 1974.

Q. When you say "ammoniated," what do you mean as far as this Camel product was concerned?

A. The Camel product used ammoniated reconstituted tobacco in its blend.

Q. That was the first RJR cigarette that did that, is that correct?

A. Commercially, yes.

Q. Were there others that came after the 1974 ammoniation of Camel?

A. There were some others, yes.

Q. What were the others?

A. Winston was first ammoniated in 1979, and then there have been other brands from time to time that have used various forms of ammoniated reconstituted tobacco.

Q. What are the other brands?

A. Well, I don't have a list in front of me. I would say just in a general sense, certainly Camel and Winston are two of our leading brands. I have already told you they were ammoniated in '74 and '79 respectively. I would guess roughly half of our brands

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or less have had ammoniated tobaccos in them at some point.

Q. And do any of them still have ammoniated tobaccos in them?

A. Yes.

Q. Which ones?

A. Camel -- some brand styles of Camel have ammoniated tobaccos. Winston, of course, does not at this point.

Q. How long ago was it taken out of Winston?

A. Winston stopped using ammoniated tobaccos in 1997.

Q. That's when they went to the marketing technique of saying no bull, no additives, is that right?

A. Winston stopped using ammoniated tobaccos when we changed the product to a no additive blend.

Q. So basically all the Winston blend has in it is 40 or more carcinogenic components that tobaccos generally always have, correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I don't understand that question.

BY MR. HOAG:

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Q. You do know that tobacco smoke has 40 or more carcinogenic components in it, right?

A. I think in the first question you were talking about tobacco containing.

Q. I said tobacco smoke. You know that tobacco smoke has 40 or more carcinogenic components, correct?

A. Tobacco smoke contains a number of constituents, some of which are thought to be animal carcinogens or possible human carcinogens.

Q. Over 40, correct?

A. If one looks at the IARC list of suspected carcinogens and compares that with what we know about smoke constituents, I would say it's over 40.

Q. And Winston still contains some of those things, correct?

A. The Winston cigarette -- smoke from the Winston cigarette still contains those constituents that we just talked about.

Q. So when Winston advertises or RJR advertises the Winston saying no bull, no additives, that doesn't mean there is no carcinogenic components, correct?

A. The smoke from Winston cigarettes contains the same constituents as the smoke from other

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cigarettes. I mean, that's the fact.

Q. Has RJR been accused of making health claims with the no bull, no additives slogan?

MR. LATHAM: Object to the form of the question.

THE WITNESS: There have been some accusations about that.

BY MR. HOAG:

Q. It's pretty obvious you are trying to imply that for some reason Winston is going to be safer than other cigarettes, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I disagree with that completely. I think the advertising states clearly what that product is, and frankly, Winston is not the only product on the market that makes that claim.

MR. LATHAM: I am going to object to this whole line of questions, John, as asked and answered. Many of these were covered on his deposition on January 7th.

BY MR. HOAG:

Q. Winston makes -- you say other cigarettes make the same claim?

A. There are some other cigarettes that make

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the claim of no additives.

Q. What other cigarettes are those?

A. Well, American Spirit is probably the best known and has the largest share.

Q. How long has it been making that claim?

A. Several years in my recollection.

Q. So did you guys make that claim in response to the success of American Spirit?

A. I think that was probably only one factor that went into our decision to market that product, but that was only one factor, not the only one.

Q. Have you increased market share of the Winston since coming up with the no bull, no additive campaign?

A. I think the best characterization of that from what I have seen is that the decline of Winston has been slowed or stopped. I don't think the share of market of Winston has significantly gone up, but I think the decline of it has stopped at least for now.

Q. What was happening to the market share of Winston prior to the time RJR came up with the no bull, no additive campaign?

A. The share of market for Winston over a number of years has been declining steeply.

Q. For example, what was the share of market

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in 1995 for Winston?

A. Well, I don't know exact numbers off the top of my head. I can give you a ball park figure if you like.

Q. Go ahead.

A. In 1995, I would guess that Winston's share of market was about five to five and a half percent for the total brand family of all Winston products.

Q. What was it immediately before instituting the no bull, no additives campaign?

A. Again, I don't know exact numbers right off the top of my head. Between '95 and '97 it of course continued to decline. I would say if you asked me to guess I would guess a number that's below five, so maybe 4.7 or something like that.

Q. What was the market share after the no bull, no additives campaign was implemented?

A. Well, that's difficult to assess over a very short period of time, but it looks like it may have gone up maybe a tenth or two-tenths. Although in the last month or two it looks like it's gone back down to where it was when we first implemented the product. It is difficult to assess because one has to factor in product that distributors buy to feed the pipe line, so that's why it takes more than just a couple months to

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assess market share.

Q. You do agree there is no safe cigarette, right?

A. Well, I think that any cigarette is a risk for certain diseases, so if you mean every cigarette is a risk factor, then the answer is yes.

Q. So there is no safe cigarette, right?

MR. LATHAM: Object to the form of the question, asked and answered.

BY MR. HOAG:

Q. So your answer is yes, there is no safe cigarette, right?

A. I think as I said, every cigarette or all cigarettes are risk factors for a number of diseases. Even if one somehow eliminated the risks of smoking, I don't know how one would prove that.

Q. How one would prove what?

A. That you have, in fact, eliminated the risks of smoking.

Q. Nicotine has health effects on the heart, right?

A. I don't know, I'm not an expert in this area. I know that nicotine affects the cardiovascular system. I know that superficially.

Q. And RJR -- in fact, every cigarette company

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produces brands of cigarettes they label low tar, right?

A. I think all major tobacco companies have low tar products.

Q. And they call them that on the package, low tar, right?

A. In some cases, not all.

Q. They advertise it as saying low tar, right?

A. I think most low tar products in advertising are identified as low tar products.

Q. And in every single one of the cigarette companies uses a word called lights to describe a form of what it calls a low tar cigarette, correct?

A. There are categories of tar yielding products that are most often identified in advertising to make it clear to the consumer what those products are. Those categories includes full flavor, lights and ultra lights and lowest.

Q. And every one of those names you just came up with, the industry itself came up with those names, correct?

A. I think in general that's correct. There is at least -- well, there are four general categories of tar levels, and I think the industry pretty well defined those, although the FTC has adopted pretty much the same categories and the same tar levels associated

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with each category.

Q. You guys like to blame the FTC for the way you market your cigarettes, don't you?

MR. LATHAM: Object to the form of the question, argumentative.

BY MR. HOAG:

Q. Don't you?

A. I don't understand that question because I don't understand what you mean blame the FTC.

Q. Well, for example, in my last question I was asking you about the use of the word light and you threw in the FTC. The FTC doesn't have anything at all with your decision, the industry-wide decision to use the word light to describe cigarettes, correct?

MR. LATHAM: Object to the form of the question, John. Ask a legitimate question.

BY MR. HOAG:

Q. That's a legitimate question, is that correct?

A. You didn't just ask about categories. You asked about the industry defining those categories. I told you the categories generally came from the industry, but have been pretty adopted by the FTC.

Q. The FTC never has adopted your use of the word ultra light and light, did they?

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A. I don't know what you mean by adopted. I know if you go to the FTC and ask for a printout of tar categories they -- and they will break it down by category if you ask, and the categories are very similar to what the industry uses. I don't understand what you mean by blame because that certainly is not the intent of this answer.

Q. What I am getting at is that the expression light, the industry came up with the expression light, correct?

A. I think I have already answered that question.

Q. What was your answer?

A. My answer is that in general the category definitions of full flavor, lights, ultra lights and lowest in general came from the industry.

Q. It isn't just in general, it is absolutely specifically it came from the industry, didn't it?

A. It's not as black and white as that because there are some slight differences in definition of which tar levels belong to which category. There is some fuzziness also because there are products that fall in between some of those categories, and so it's not black and white.

Q. The entire industry uses the expression

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ultra light to describe certain brands of cigarettes itself, correct?

A. As I have said, the major tobacco companies use terms to define categories and the major tobacco companies in the U.S. have products that are called ultra lights.

Q. Not a single one of those products is safe, correct?

A. Every cigarette is a risk for certain diseases. Cigarette smoking is clearly a risk.

Q. Every single one of those cigarettes including the ultra lights cause cancer, don't they?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I have already answered your question in that all cigarettes -- cigarette smoking is a risk factor for a number of diseases. All cigarettes, I believe, present a risk for those diseases.

BY MR. HOAG:

Q. Every single one of those cigarettes, including the ultra light, cause cancer, correct?

MR. LATHAM: Object to the form of the question, asked and answered.

THE WITNESS: I don't know whether cigarette smoking causes cancer. It may, but it's

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clearly a risk factor for a number of diseases, including cancer.

BY MR. HOAG:

Q. With all the information you have, with all the scientific information you have available to you, as you sit here today, June 2, 1998, you don't know whether or not cigarette smoking causes cancer, is that correct?

MR. LATHAM: Object to the form of the question. You asked all these questions on the January 7th deposition and you are just wasting time.

BY MR. HOAG:

Q. Is that correct?

A. I don't know as I sit here whether or not cigarette smoking causes cancer. It may. That's what a lot of scientists is working very hard to find out.

Q. You actually believe that that is something we need to find out, it's not something that has been known for decades, correct?

A. I believe it's something that we do need to find out, that scientists need to prove one way or the other, and I believe there is a lot of good scientific research going on in the area, particularly in molecular genesis of chronic disease.

Q. And as soon as you find out and you know for sure, you are going to quit selling those ultra

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light cigarettes or at least calling them ultra light, aren't you?

MR. LATHAM: Object to the form of the question, argumentative.

THE WITNESS: I don't think that's fair at all. I think if we know -- let's assume that it's proved that cigarette smoking, in fact, causes cancer. If that's the case, then we know -- we will know how that happens and we can, I think, fix cigarettes or change cigarettes to reduce or eliminate the chance of that happening.

BY MR. HOAG:

Q. When you sell these ultra lights -- these cigarettes you call ultra lights, you and everyone in the industry call ultra lights, when you sell them, you make sure that you include enough nicotine in those cigarettes to keep people smoking, correct?

MR. LATHAM: Object to the form of the question. You went through all these areas in the January 7th deposition. Why don't you move on to a topic that relates to what Dr. Townsend is here for.

BY MR. HOAG:

Q. Is that correct?

A. No, that's not correct at all.

Q. There isn't a minimal level of nicotine

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that you know a cigarette has to contain in order to keep people smoking cigarettes, is that right?

A. I'm not aware of a minimal threshold level of nicotine. I do know for a given tar level, the nicotine level needs to be in a certain range to be consumer acceptable. If it's too high it's not consumer acceptable. If it's too low, it's not consumer acceptable.

Q. You know when you tried a denicotinized cigarette nobody bought it, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: One of our competitors marketed a cigarette with extremely low nicotine levels relative to the tar level. That product wasn't consumer acceptable. I think if the nicotine level is extremely low compared to tar, in general, those products are not consumer acceptable. Just as if the nicotine is too high relative to a tar level, then those are not consumer acceptable products.

BY MR. HOAG:

Q. What you know is you have to have nicotine in the products to keep people smoking the products, right?

MR. LATHAM: Object.

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THE WITNESS: What I know is the ratio of nicotine to tar has to be within a fairly low range to be consumer acceptable.

BY MR. HOAG:

Q. To keep people smoking the cigarettes, correct?

A. I don't understand that question.

Q. By consumer acceptable that's just a euphemism to keep people smoking cigarettes?

MR. LATHAM: Object to the question.

THE WITNESS: Consumer acceptable is not a euphemism as you suggest. Consumer acceptable is to make the best products so smokers will smoke our products versus the competitors.

BY MR. HOAG:

Q. So smokers will smoke?

A. Whether a person smokes or not is their choice. What I am interested in is making the best products that have the highest consumer acceptance so that people will buy my products and not my competitors'.

Q. All of your competitors call this various cigarette ultra lights and lights. You all use the same names. You all have the same research about nicotine and you all make sure there is enough nicotine in there

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to keep people smoking cigarettes, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I have already answered this question. The answer is no.

BY MR. HOAG:

Q. Those documents you are relying on say the answer is yes, don't they?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I don't know what documents you are talking about.

BY MR. HOAG:

Q. The documents that consistently measure the nicotine level to make sure it's in there?

A. We consistently measure nicotine to ensure consistency of our product. In product development we measure both tar and nicotine as we develop products to make sure we meet tar targets, to make sure we meet consumer acceptance targets because we know that if the tar-to-nicotine ratio is too high or if it's too low, those are not acceptable products. We know that from experience.

Q. You know that if you take out the nicotine people aren't going to smoke your products. You know

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that if you keep the nicotine in you are going to keep people hooked, correct?

MR. LATHAM: Object to the form of the question, asked and answered five times.

THE WITNESS: I don't think that's correct at all.

BY MR. HOAG:

Q. Do you know Claude Teague or did you know him?

A. I knew him, but not very well.

Q. Who is he?

A. He was a scientist that worked in the research and development department a number of years ago.

Q. A scientist?

A. He was a chemist.

Q. Did he have a Ph.D.?

A. Yes, he did.

Q. Did he have any titles other than scientist?

A. Well, I think he had a number of titles, including director.

Q. Director of what?

A. Well, I think he has been or -- he was before he retired director of a number of things. At

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one point he was director of R&D planning. At another point he was director of administration which meant that he was in charge of the facility and some support activities.

Q. Was he ever your supervisor?

A. No.

Q. At one point Claude Teague was director of research and development planning, right?

A. I believe that's probably a paraphrase of his title, but yes.

Q. When was he director of research and development planning?

A. I would have to guess. I am not entirely sure. If I am going to guess I would say in the '70s to maybe even early '80s. Around the early '80s I think he was director of administration facilities, but that's a guess.

Q. Among the documents that you recently collected after the last deposition I took of you in Engle, are some research that was done in the 1950s regarding at least some of the carcinogenic components in cigarette smoke, correct?

A. There are some documents that speak to smoke constituents.

Q. Right, and the RJR and actually the whole

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tobacco industry was doing internal research back in the '50s looking at all these carcinogenic components in their cigarettes, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: In the '50s and since, RJ Reynolds has done extensive research trying to identify constituents in cigarette smoke.

BY MR. HOAG:

Q. And at the same time RJ Reynolds was doing this internal research, they were systematically denying that there was any link between the stuff in their cigarette smoke and disease, correct? We are talking about the 1950s.

MR. LATHAM: Object to the form of the question.

THE WITNESS: I am not aware of systematic denials by Reynolds while we were doing that research. From a scientist's point of view I see there was research. It was good research. Again, I am not aware of consistent denials of the link.

BY MR. HOAG:

Q. You were working in the PR department, right?

A. I wasn't working at Reynolds at that time.

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Q. You didn't work for the Tobacco Institute, right?

A. I am a scientist. I look at the science that has been done and that's what I'm talking about.

Q. You don't look at every behavior of the entire corporation, right?

A. Of course not.

Q. You just look at a little tiny piece of it and you make comments about that, right?

MR. LATHAM: Object to the form of the question, it's argumentative. Why don't you ask a legitimate question. This is ridiculous.

MR. HOAG: I know they bother you. I know you don't like these questions, but I'm asking them.

THE WITNESS: I don't understand your question. It doesn't bother me. I don't understand it.

MR. HOAG: I am not talking to you. I am talking to the attorney that just objected with his speaking objection. I am not saying that any of these questions bother you. I don't think they do bother you. I think you just answer the questions.

If you could repeat the question that I asked before I was interrupted, please.

(The-record was read.)

BY MR. HOAG:

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Q. By that I mean what the corporation's behavior is. You just look at the part that you are involved in, you don't look at the big picture, right?

A. I don't think that's accurate. I see pieces of what this company does beyond my direct responsibility.

I don't have a complete picture of everything this company does as I am certain no one does, except the president, of course, and I certainly don't have a complete picture of everything that has happened at this company since the '50s, but I certainly do believe that I know a number of things that go on outside of my direct responsibility.

Q. Let me just check on what you know on certain things and if you don't know that's okay, too. I just want to know. The Tobacco Institute, do you know what kind of activities the Tobacco Institute was involved in in the 1950s?

A. In the 1950s, no.

Q. Do you have any inkling as to what the Tobacco Institute did in the 1950s?

A. I have an inkling. I don't know what the Tobacco Institute did in the '50s.

Q. Do you know what the Tobacco Institute is?

A. Yes, I do.

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Q. What is it?

A. It's a group that for the industry has provided public relations and they reside in Washington.

Q. Do you know when they first started?

A. Specifically, no.

Q. Do you know the reason they started the Tobacco Institute?

A. Specifically, no.

Q. Do you know whether or not it was in response to scientific publications in the 1950s linking disease with cigarette smoking?

A. I don't know that.

Q. So to the extent that that kind of information is in internal documents, those are internal documents you looked at, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I beg your pardon?

BY MR. HOAG:

Q. To the extent that information is in internal documents or any other documents, those are just things you haven't looked at, correct?

A. You asked me what I know and I wasn't around at that time. I don't know the answer to those questions.

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Q. Well, you don't have to be around at that time to have reviewed internal documents, though, correct?

A. Well, that's fair.

Q. And you haven't reviewed those particular internal documents or any documents about the Tobacco Institute, correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Well, I think it's accurate to say that I have seen documents that relate to the Tobacco Institute. What I know about exactly what went on in the '50s with the Tobacco Institute, you know, I have no idea, but I have seen some documents.

BY MR. HOAG:

Q. Have you seen any press releases from the Tobacco Institute in the 1950s where they deny any link between disease and cigarette smoking?

A. I can't recall press releases of that sort.

Q. Do you recall ever seeing any press release from the Tobacco Institute or anywhere else where the link between cigarette smoking and disease is denied?

A. No, I can't recall seeing that.

Q. You do know that even now the cigarette industry, including the CEO, at least up until 1997 and

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'98, every CEO denies that cigarette smoking was additive? You are aware of that, correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I don't know what you mean by 1997.

BY MR. HOAG:

Q. It could have been '98. There did come a point within the past maybe few months where a few of the CEOs changed their tunes slightly on addiction, but you are aware that right up until at least 1997 that the cigarette industry, the entire industry was in denial that cigarette smoking was addictive, correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: If I recall correctly, we have talked about this in a prior deposition about addiction, and it's clear that the word addiction has many definitions. Whether or not cigarette smoking is additive depends on your definition.

BY MR. HOAG:

Q. Right, and the cigarette industry denies that it's addictive?

MR. LATHAM: Object to the form of the question.

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BY MR. HOAG:

Q. It flat out denies that it's addictive until the last two months until they put out words like you are right now, right?

A. I think the major tobacco companies have said in the past that cigarette smoking is not additive. It's what I believe as well because of the definition that I hold on addiction.

Q. It's a very popular definition within the cigarette industry, isn't it?

MR. LATHAM: Object to the form of the question, it's argumentative.

THE WITNESS: I think it's a very popular definition throughout society, frankly.

BY MR. HOAG:

Q. Well, frankly, can you name even one scientist in the tobacco industry that believes cigarette smoking is addictive?

A. I don't know. I haven't polled every scientist in the industry.

Q. Have you spoken to any of them?

A. Spoken to any scientist?

Q. In the industry, right.

A. Is your question have I spoken to any scientist in the industry?

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Q. Yes.

A. I speak to scientists in the industry a lot.

Q. Do you speak to any of them about whether they believe cigarette smoking is addictive?

A. We have had some discussion like that.

Q. Can you name even one that thinks it is?

MR. LATHAM: You broke up at the end of the question.

BY MR. HOAG:

Q. Can you name one of those people you spoke to that believes cigarette smoking is addictive?

A. I am not aware of anybody that I have talked to informally that says that cigarette smoking is addictive. Again, it's a matter of definition.

Q. Back in the 1950s and the '60s and the '70s the cigarette industry at RJR, they were doing internal research about the carcinogenic components of cigarette smoke, right?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Beginning in the '50s RJ Reynolds was doing extensive research into the composition of smoke, trying to identify as many constituents in smoke, including those that are thought

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to be carcinogenic.

BY MR. HOAG:

Q. And even though they verified that all these carcinogenic components were in the cigarette smoke, basically verified research done in the outside world, they still continued to deny any harmful effects of cigarette smoking in the 1950s, didn't they?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Beginning in the '50s RJ Reynolds undertook a major program to understand cigarette smoke composition. RJ Reynolds was not only confirming what scientists outside of Reynolds had published, but we were also developing scientific information that we published for the first time.

So we contributed to the scientific knowledge on smoke composition. I don't understand based on the earlier questions and answers about denying the link. I am just telling you as a scientist what we did.

BY MR. HOAG:

Q. It's okay with me that you don't understand that. That's a perfectly acceptable response. I just wanted to know.

Those cigarettes that they knew had all

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these carcinogenic components, they still continued to sell those cigarettes in the '50s and '60s and '70s, didn't they? I'm talking about RJR now.

A. Cigarette smoke contains a number of constituents, including some that are thought to be carcinogenic to animals or even possible human carcinogens. They are contained in cigarette smoke at very, very low levels. All cigarettes sold by RJ Reynolds in the '50s and '60s and '70s, I believe, contain those constituents.

Q. Not only did RJR know it contained those constituents, but when it came to people mentioning the possibility of a warning label back in the '50s and even during the time when it was ultimately voted on, RJR in the tobacco industry, they fought that cigarette label, warning label tooth to nail, didn't they?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I don't know the details of that, frankly.

BY MR. HOAG:

Q. They didn't want the warning label, correct?

A. Again, I don't know the details of that at all.

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Q. And they definitely didn't want anything on the label of the cigarette to say cigarette smoking is addictive?

MR. LATHAM: Object to the form of the question, asked and answered.

THE WITNESS: I don't know the details of that. You need to talk to somebody that does.

BY MR. HOAG:

Q. Have you looked at any documents at all that talked about that?

A. That talks about the Congressionally mandated health warnings?

Q. That talks about how the industry, including RJR fought against the health warning?

A. I can't recall any documents about that. You need to talk to somebody that knows about this area.

Q. That's just not your area, right?

A. I just said you need to talk to somebody that knows something about this area.

Q. And you are not that person, right?

A. I'm not that person.

Q. So to the extent if RJR did fight against having any warning label on its cigarettes, you just don't know one way or the other, right?

A. I think I have already answered this

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question. I don't know the circumstances around the question that you just asked. I don't know what happened.

MR. LATHAM: John, why don't we take a five to ten minute break.

MR. HOAG: Okay.

(Off-the-record, brief recess.)

MR. LATHAM: I just want to make a short statement on the record. To the extent you continue to ask Dr. Townsend questions that relate to areas you have already covered at his prior deposition in this case, we are going to object as asked and answered and that will be it.

MR. HOAG: You guys wanted this additional deposition and you really wanted it badly, and for the record, he had one crack and he answered every question he could, and you guys then collected additional documents that he didn't even rely on the first time when you should have had him ready to do that to begin with.

Those documents are all about the same issues he talked about before, so to the extent the documents are about the same exact issues that were in the record before, and to the extent that he is relying on internal documents that weren't provided before, even

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though it's the same subject matter, I can most assuredly ask him questions about the same subject matter and what you said -- what I said is on the record.

Can we have as an exhibit now, please, as Plaintiffs' Exhibit No. 1, the document that are bates stamped number 51122 3463 and at the top says secret implications and activities arising from correlation of smoke pH with nicotine impact, other smoke qualities and cigarette sales.

MR. LATHAM: He has the document in front of him.

THE WITNESS: I have the document in front of me, but the document starts with 3460 and goes to 3484.

BY MR. HOAG:

Q. It starts with 3460?

A. Yeah. That's the document I have in front of me.

MR. HOAG: I don't see the first two pages. At least I don't have them in front of me, but that's okay. If we could just get that entire document marked as Plaintiffs' Exhibit No. 1, please.

(Exhibit No. 1 marked for identification.)

BY MR. HOAG:

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Q. What is on the page number that would be the last four bates stamped numbers would be 3460? What does that say?

A. 3460 appears to be a blank page except at the right-hand margin it says "Personal Contracts." Page 3461 is a page that has a Post-It note on it. It says "Bob - this is where we were in '73. You may want to skim/scan the first four pages, Claude," and then at the bottom part of this Post-It note it says "Thank you Claude, looks like we are still there in 1983, Bob." That's page 3461.

3462 is a document stamped secret, October 2, 1973 from Claude Teague to William D. Hobbs, "Re: Report on 'Implications and Activities Arising from Correlation of Smoke pH with Nicotine Impact, Other Smoke Qualities, and Cigarette Sales.'"

The text of this memo says "I hope the attached report is about what you had in mind. The text is just over four pages long. The rest is back-up material; the thirteen charts used in our presentations, and three appendices."

Next paragraph "Please let me know if there is anything else you will need." It's signed Claude Teague. It's copied to Mary Senkus and there is some handwriting at the bottom that's illegible.

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Q. Okay. Referring to the portion of the document that you already read that's from -- that has the name Bob on it?

A. Yes.

Q. It looks like we are still there in 1983.

A. Yes.

Q. Do you know who Bob is?

A. Yes.

Q. Who is that?

A. Bob DiMarco.

Q. Who is he?

A. He was senior vice president of R&D at the time.

Q. Senior vice president of research and development?

A. Yes. He was in charge of research and development at the time.

Q. What were his duties as senior vice president of research and development?

A. He was responsible for all research and development activities for RJ Reynolds.

Q. At the time, you are talking about 1983?

A. Yes.

Q. Did he ever supervise you?

A. Well, of course he did, just not directly.

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I never reported directly to Bob.

Q. What is his educational background? Does he have a Ph.D.?

A. Yes, he did.

Q. In what?

A. I believe it was in food science. He was a professor at Rutgers at one point and he has a varied background.

Q. What did he teach at Rutgers?

A. Food science, I believe.

Q. I'm sorry, I missed the first part?

A. Sorry, food science.

Q. What was his Ph.D. in again?

A. I believe it was in food science, the best of my recollection.

Q. Do you know what he was referring to when he said still there in 1983?

A. If I take it together with the rest of this document, I would assume what he means is the theories of pH and ammoniation and free nicotine as Teague was outlining in this document that begins -- in the portion of the document that begins 3463 is the last four bates numbers.

Q. You reviewed this document before, correct?

A. Yes. It's been awhile since I have read it

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very carefully, but, yes, I have reviewed it a number of times.

Q. When did you first see this document?

A. I can't exactly say. It's been years.

Q. When you say "it's been years," about how many years?

A. Well, I can't exactly say. I would say if you are forcing me to guess, I would say perhaps five, six years ago, just a guess.

Q. Was this among the documents that were selected for you after the first Engle deposition was taken?

A. This is a document that I have in my file that I have referred to a number of times over a number of years.

Q. So when you originally were talking to me today about those documents that were just provided to us, meaning Stanley Rosenblatt, P.A. recently for your deposition today, one of the things you said is you went through your files. This document was one of the things you found when you went through your files?

A. This document is a document that I have used repeatedly over a number of years. I have a copy of this in my files and actually this document has been spoken to in prior testimony.

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Q. Prior deposition testimony?

A. Yes.

Q. Has it been shown to you in other depositions?

A. Yes.

Q. Do you remember which ones?

A. No, I really don't offhand, sorry.

Q. Do the documents that we have been provided, meaning Stanley Rosenblatt, P.A. for this deposition today, do they include everything that was in your files that is related in any way to your testimony?

A. Everything that is provided to you for this deposition are documents that will form the basis of my testimony if I am called to trial in Engle, so I think everything is certainly connected.

Q. Does it include everything that's in your files that's related in any way to your testimony or is it a selected portion of what's in your files that you just chose to provide to us?

A. There are certainly documents in my files that relate to these topics, however, the documents that are provided to you are the documents that I will use if I am called at trial, and those documents only.

Q. So you do have additional documents in your files that are related to issues concerning, for

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example, pH and ammonia or ammoniation that are not included in this document that we have been provided, is that correct?

A. There are documents that speak to these issues that are not included in the boxes, but the documents that we have provided in the boxes to you form the basis of my testimony.

MR. HOAG: To the extent we don't have all the documents that are in your personal file that are related to this issue, we would again move to continue the deposition until we have been provided with everything that is in his file related to his testimony rather than a selected portion of those things and also request that they be provided to us.

This particular document within your file and also you said that you did a library search yourself in the RJR library?

THE WITNESS: I did some search in the library. I had to search my files. I had one staff member go through some files and also had an attorney go through a detailed search of the library information.

BY MR. HOAG:

Q. What was your search missing that the attorney was supposed to do for you?

A. My search because of time constraints

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wasn't as complete.

Q. How do you know that the attorney's research is complete?

A. Well, I can't guarantee that it's absolutely 100 percent complete. We did go through and I went through each of the documents that we provided to you and determined document by document that those documents, in fact, are the basis for my testimony if I am called at trial.

Q. As you went through these documents that you had found and the attorney had found and staff members had found, did you remove any of the documents and not include them?

A. There were some documents certainly that were redundant, that didn't add anything and are not included in the list.

Q. And the decision about whether or not they were redundant or didn't add anything, that was your decision, right?

A. It was my decision and it was my decision of which documents are on the list that were provided to you.

Q. Some of the documents that you consider to be redundant and not adding anything, those are internal company documents that are confidential, is that

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correct?

A. Well, there are some internal documents that are redundant that I removed. There are some external documents that speak to various issues on the external list that were redundant and I removed.

Q. Which confidential internal documents did you remove, if you remember?

A. I don't remember specifically. I went through quite a few documents.

Q. Did you keep track of the ones you removed, the internal confidential company documents?

A. No, I didn't keep track of them.

MR. HOAG: Again, we renew our objection that we haven't been provided with all the documents that have been reviewed. There are internal documents that are confidential that we wouldn't have access to otherwise.

MR. LATHAM: You have been provided with all the documents that will form the basis for Dr. Townsend's opinions. You have all of them. There aren't any additional documents that he will be relying on or that he will be using at trial should he testify. You have all the documents.

MR. HOAG: For the record, I understand that we are not going to be able to rectify this today,

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but for the record, to the extent that this witness has access to information that we don't have access to to begin with, he gets to select what he is going to rely on. We don't even get to see what other information there is that's confidential and internal. We have not been given a fair opportunity to do a complete deposition.

MR. LATHAM: You have been provided with all the documents that he will rely on that form the basis for his opinions for the testimony should he be testifying in the Engle trial.

BY MR. HOAG:

Q. As to what has been marked as Plaintiffs' Exhibit No. 1, you identified the first few pages. What is marked as bates stamp 3463, that does say secret at the top, implication and activities arising from correlation of smoke pH with nicotine impact, etc., correct?

A. Yes.

Q. This document was authored by and signed on page bates stamped 3469. On that particular page, this is signed by Claude E. Teague, correct?

A. That's correct.

Q. And your understanding is that this memorandum was created in 1973, is that correct?

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A. I believe that's correct.

Q. What do you base that on?

A. The time frame of what is said in here. I think from the context and also from the Post-It note on bates 3461, this is where we were in '73, and also on 3462, the cover note from Claude Teague to William Hobbs is dated 1973.

Q. Does it appear that Claude Teague wrote that particular handwritten memo in 1983?

A. I don't know Claude's handwriting. It is signed Claude. That's the only Claude I have ever heard of in the research and development department.

Q. And it has a 1983 date on it?

A. not on the Post-It note, but it says at the bottom authored by Bob and I do know his handwriting. It looks like we are still there in 1983. So my assumption would be that that handwritten note was in 1983.

Q. What position, if you know, did Claude Teague hold in 1983?

A. Well, in 1983 he had just finished orchestrating the design and construction of our new R&D facility. I think he was director of administration or administration services or something of the sort.

Q. When you say orchestrating and facilitating

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the new R&D facility, what do you mean?

A. I mean he was responsible for the design and construction of a new R&D building.

Q. A new research and development building?

A. Yes.

Q. Where is that located?

A. Located in Winston-Salem.

Q. What was his title during the time he had that responsibility?

A. Well, I don't know specifically. Again, I think he was director of administration or administrative services and he spent -- and this is my personal recollection, he spent virtually full-time at that point trying to design the best facility for our needs.

Q. And did he do that?

A. Did he do what?

Q. Did he accomplish that goal?

A. Well, he designed together with architects, did design an excellent facility. I don't know that it's the best, but it certainly is an excellent facility.

Q. You said that was located in North Carolina?

A. No, I said it was located in Winston-Salem.

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Q. That's North Carolina, isn't it?

A. Yes.

Q. What position did Claude Teague, Jr. hold in the company in 1973, if you know?

A. To my recollection, I think he was director of R&D planning at that time.

Q. Director of research and development planning?

A. Yes, that's fair.

Q. Referring to the first page of the secret document which says at the top implications and activities arising and then has an introduction and data, do you see that page?

A. Yes. The first page of the actual text?

Q. Right.

A. Yes.

Q. Under historical data, trends and brand comparisons, in the second sentence it says "It soon became apparent that in recent years, corresponding to recent sales performance, the most significant difference between our brands and Philip Morris brands and Kool has been in the area of smoke and pH."

Do you know whether or not that is true for that period of time?

A. You are asking me for what I believe to

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actually be true?

Q. For that period of time was that accurate?

A. In that period of time there were quite a lot of differences between Marlboro, the Philip Morris brand and RJ Reynolds brands. There were a number of significant differences. I don't agree that the most significant difference was in the area of smoke pH. There were some measured differences between Marlboro and, say, Winston or Camel at the time, but I think there was major differences in other properties, particularly in the taste attributes of the two products.

Q. In your opinion, does smoke pH have anything to do with the taste attributes of products, of cigarette products?

A. I think if one altered pH to a large degree, I think it would change sensory impact.

Q. When you say "sensory impact," what do you mean?

A. I mean irritation in the oral cavity primarily.

Q. Other than primarily meaning irritation in the oral cavity, do you mean anything else secondarily?

A. No, I don't.

Q. That's the only thing you mean?

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A. What we know from experiments that have revolved around this theory of smoke pH is that if one manufactures experimental prototypes that have substantially different pH on the high side, those products are judged harsh and irritating. If the pH is altered to the low side of commercial products, those products are judged weak and bland and not sufficient oral sensation.

Q. Have you ever heard of a researcher, a scientist named Dr. Frank Vulotta?

A. No.

Q. You never heard of him?

A. No, I can't recall hearing his name.

Q. I believe it's V-u-l-o-t-t-a. He is a Philip Morris scientist.

A. I can't recall his name.

Q. Do you know whether or not anyone has done research on brain wave patterns of smokers during the time of smoking cigarettes?

A. That wouldn't surprise me at all. We have done quite a lot of research at Reynolds looking at physiological effects of smoking.

Q. Has Reynolds done brain wave patterns research?

A. Years ago there was some experiments along

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those lines.

Q. Who did those experiments?

A. The best I recall, John Reynolds and probably John Robinson.

Q. What were their findings, if you can recollect?

A. I don't really recall the findings. They have done research in a number of areas. The best of my recollection, that was one area.

Q. Do you know whether or not they researched whether brain wave patterns are more rapid or change in any way if ammonia or a derivative of ammonia is added to cigarettes?

A. I'm not aware of such an experiment at all.

Q. Do you know if any such experiment has ever taken place, whether it's in RJR or anywhere else?

A. I don't know.

Q. Do you know whether or not adding ammonia to cigarettes raises the pH level?

A. I think from experiments, if one adds a lot of ammonia in certain ways, one could affect pH. I do know that at the levels we have used in commercial products it doesn't affect the pH.

Q. At all?

A. From my review of commercial pH data -- I'm

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sorry, pH data from commercial cigarettes, I don't see substantial changes in pH with ammoniated tobaccos versus non-ammoniated tobaccos.

Q. Do you know whether or not ammoniated tobaccos raises pH by, for example, from six to 6.2?

A. I don't think that -- again, based on my review of historical data, I don't see any trends in pH that result from the use of ammoniated tobaccos.

In fact, if one looks at the recent change of Winston products in 1987 -- I'm sorry, 1997, go into a no additive blend where we took ammoniated tobaccos out, we, in fact, measured exactly the same pH in commercial products after that we had before. We also have similar data comparing Camel before and after ammoniation where there is no difference in pH.

Q. So you personally aren't aware of even a tenth -- like from six to 6.1, from 5.8 to 5.9, you are not aware of any increase of pH after ammonia has been added, correct?

A. What I have said is in the comparison with and without ammonia, I don't see changes or differences in pH. The method is not accurate enough or precise enough to make the statement that you are making because repeated measures of the same sample of cigarettes can vary by a couple tenths, from exactly the same sample of

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cigarettes.

Q. Is there any difference between six and 6.2? Are you saying there is really no difference as far as pH is concerned?

A. As a chemist, based on what I know about the test method and based on my review of a lot of pH data, I would say there is no substantial difference there. The variability in the test method is actually fairly large.

Q. When you say "substantial difference," what do you mean?

A. Any meaningful difference, that's perhaps a better word.

Q. I guess on this first sentence then what Claude Teague is saying about smoke pH, you are saying you don't agree with, correct?

A. The sentence that begins "It soon became"?

Q. Yes.

A. Well, I think Claude certainly believed this, that certainly suggesting corresponding recent sales performance the most significant difference was in the area of pH. I think he believed that.

I think there were some differences in the measurements between Marlboro and Winston at the time. I think that drove, of course, these theories. I don't

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agree personally that the most significant difference was, in fact, pH because as I said before, I think there were major, major differences in taste characteristics.

Q. You said you think. Taking out the word most, do you think it was a significant difference?

A. I think at the time in the early '70s it was a difference. Based on what I know about pH at this point, I don't think it would be a significant difference.

Q. The next sentence says "that smoke pH is a means for expressing, on a 0-14 scale, the degree of acidity or alkalinity of the smoke system." Do you agree with that?

A. Well, I think this is a very complicated area, that of pH of a material like cigarette smoke. Certainly to be very clear, pH is a measure of acidity or alkalinity in dilute aqueous solutions. Cigarette smoke is not a dilute aqueous solution, however, one can use various techniques and get a pH measurement that in some undefined way relates to acidity or alkalinity. So in a general sense I would say, yeah, that is a fair statement. In a very detailed technical sense, I think it's far more difficult.

Q. Do you agree that it's a zero to 14 scale?

A. Well, zero to 14 is an arbitrarily defined

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scale for pH. That's the scale.

Q. In the next paragraph it says "Our data show that smoke from our brands, and all other significant competitive brands, in recent years have been consistently and significantly lower in pH (less alkaline) than smoke from Marlboro and to a lesser degree Kool."

As far as the jury in 1973 is concerned, do you agree with that?

A. I agree with that in the sense that there were differences in the pH measurements between Marlboro and to a lesser degree Kool compared to, say, Winston as an example. I agree that there were differences. Significantly, I don't know, but there certainly were differences measured.

Q. Moving down to a little below the middle of that paragraph it says that "All evidence indicates." Do you see that?

A. Yes.

Q. "All evidence indicates that the relatively high smoke pH (high alkalinity) shown by Marlboro (and other Philip Morris brands) and Kool is deliberate and controlled."

Do you agree in 1973 that was an accurate statement?

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A. I agree that in 1973 that was an accurate hypothesis. What the scientists found was that Marlboro, and to a lesser degree Kool, showed somewhat higher measured pH numbers. The speculation then was that that was a result of deliberate or controlled tobacco processing.

Q. Do you know whether or not that was deliberate and controlled?

A. I don't know. There have been a lot of theories and a lot of speculation about that. I do know that a few years after this document was written Marlboro pH came in line with that of other products on the market.

Q. Well, a few years after this didn't -- for example, one year after this didn't you, meaning RJR, raise the ammonia level in Camel?

A. In 1974, we used ammoniated reconstituted tobacco in Camel.

Q. And in 1979, you did the same thing with Winston, right?

A. That's right.

Q. And was this ever done with any other RJR brands other than Camel and Winston?

A. Well, I think we already talked about that earlier this morning. There have been a number of

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brands and I would say overall probably less than half of our brands at sometime have had ammoniated tobaccos.

Q. Of the brands that have the ammoniated tobacco, what percentages of the total sales of RJR did that represent?

A. That's difficult for me to say right off the top. I really cannot give you a good number off the top of the head.

Q. What percentage of the total sales of RJR does the Camel brand represent in 1974?

A. In 1974, it was quite low. I can't give you a specific number, but I would say only a few percent.

Q. Of the total sales for RJR?

A. Oh, no, I'm sorry, I was thinking market share. I would say for RJR sales it would be a few tens of a percent, so ten, 20 percent of our total sales perhaps.

Q. What percent of RJR total sales did Winston represent back in 1973 to 1979?

A. Well, clearly the majority of our sales.

Q. By that you mean over 50 percent?

A. Yes.

Q. After 1979, up to let's say 1985, for example, was Winston still more than 50 percent of the

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sales of RJR?

A. At that point Winston was on a steep decline. I couldn't say that with certainty.

Q. Right now what brand is the best seller for RJR?

A. Doral.

Q. What percent of the total sales of RJR does Doral represent?

A. I don't know. I can't give you a concrete number. It's certainly a larger percentage than Winston. I can't give you a specific number.

Q. Do you have a range, more than 20 percent?

A. I really can't guess. We typically look at market share as opposed to share of RJR business, so I can't really guess, but it is our largest selling brand family.

Q. What is the market share for that brand?

A. Market share for all of Doral is -- it's in the six to six and a half percent share of market range I would say.

Q. What's the market share for Winston right now, about five?

A. It's below five, slightly below five.

Q. And the total market share for RJR is what right now?

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A. About 27 percent, roughly.

Q. When was Doral first introduced?

A. There have been two versions of Doral. There was a version of Doral that was what we call full price brand. I really don't know when it was first introduced into the market, but it's been quite a long time ago, more than 20 years ago. That product was discontinued because of poor sales. The brand name came back then as a lower cost product, so the Doral today is a lower cost product.

Q. Aside from being a lower cost product, is that marketed as a low tar product?

A. The Doral brand family includes a number of different brand styles that have different tar levels. There is full flavor. There is lights, menthol and regular. There is a variety of different styles.

Q. Which style sells the best, sells the most cigarettes?

A. For the Doral family specifically?

Q. Yes.

A. I don't know off the top of my head. I would have to go back and look.

Q. In the third paragraph of that page we are still on under historical data, there is a sentence -- the last sentence at the bottom of that paragraph it

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says "This has raised questions as to: (1) the effect of higher smoke pH on nicotine impact and smoke quality, hence market performance, and (2) how the higher smoke pH might be accomplished."

Do you know whether or not RJR did anything to try to accomplish higher smoke pH in any of its products?

A. As I said earlier, I think there were a number of scientists at Reynolds and even outside of Reynolds that explored this theory about smoke pH. I think there were certainly some people at Reynolds who sought ways to increase smoke pH in the -- in an attempt to increase consumer acceptance and consequently increase sales. We have talked about Winston a number of times. You have come back to the fact that we ammoniated Winston in 1979. The fact is that since 1979 Winston sales and -- well, Winston sales have declined dramatically in spite of ammoniation.

Q. So when did the decline start for Winston, what year?

A. I can't give you a specific year as we sit here. Certainly records exist to that effect, but I would guess in the mid '70s.

Q. The decline continued consistently until 1997, is that right?

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A. Winston brand family share of market declined consistently up until the introduction of the new no additive product in 1997. As I said earlier, I think the share of market at least at this time is stable. It's not continuing the decline. We'll see how long it lasts and I hope it does.

Q. What was the market share in 1970 of Winston?

A. Well, you are asking a lot of detailed questions that, of course, there are company records that can specifically speak to that. I just don't happen to have those off the top of my head. Share of market for Winston however was large. Winston was at that time in 1970, I believe, the largest single brand family in the country.

Q. So it was a larger brand family than Marlboro in 1970?

A. I believe that's correct.

Q. So it was in the '70s when Marlboro started to take the market share away from Winston?

A. Marlboro started growing back in the '60s. It's been growing rapidly ever since, and I believe it was in the '70s sometime that it passed Marlboro as the major brand. Throughout that period Winston has declined gradually to where it's now not even the top

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three brands.

Q. Did RJR, to your knowledge, ever do any kind of test with consumers who they had smoke the Winston and then smoke the Marlboro and compare the two?

A. We have done extensive consumer testing comparing our products versus a number of competitors, including Marlboro.

Q. Was there ever a time when -- in the '70s after the decline began for market share for Winston, is there ever a time in the '70s or the '80s or even the '90s when there were was some consumer research done which would include research on smokers who were employees of the company where smokers were given a Winston and a Marlboro type cigarette and a significant percentage of them preferred the Winston?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Well, we have done quite a few consumer studies comparing our products with competitors and over that broad a time period, I really don't know. We would have to go back and look at detailed consumer test records. Certainly there have been many, many tests done.

BY MR. HOAG:

Q. There may have been studies like that, but

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you just would have to go back and look to know for sure, is that right?

A. Well, that's the essence of my answer, there have been many, many tests done. That's a long period of time. Certainly we could go back and look at records and determine that.

Q. So is it true that even if you were able to win a taste test at some point after revising the taste and other factors in a Winston, you still might not necessarily increase market share because of the advertising for the Marlboro, is that true?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I think that's a reasonably fair characterization. Certainly share of market depends on a number of things, including the product itself and the advertising itself.

BY MR. HOAG:

Q. And because of brand loyalty, too, correct?

A. Brand loyalty is a factor that's related to advertising, I think.

Q. Once the people got used to the smoking a Marlboro and they liked it, they wouldn't necessarily have a reason to change over to Winston even if Winston now tasted good or better, correct?

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A. In a general sense, that's fair.

Q. The next page of this Plaintiffs' Exhibit No. 1, which has the last four pages bates stamped 3466, starts at the top smoke pH, and in quotes, "free nicotine." Do you see that?

A. Yes.

Q. The first sentence says "In essence, a cigarette is a system for delivery of nicotine to the smoker in attractive, useful form." Do you agree with that?

A. No, I don't.

Q. Of course you know Claude Teague wrote that and believed that, correct?

A. Well, I see that Claude Teague wrote that. I have seen this sort of language in different forms in other documents that Claude wrote. I have to assume that he believed that, but I don't.

Q. The next sentence says in quotes "At 'normal' smoke pH, at or below about 6.0 essentially all of the smoke nicotine is chemically combined with acidic substances, hence is non-volatile and relatively slowly absorbed by the smoker." Do you agree with that?

A. No, I really don't agree with that because the dynamics of cigarette smoke on inhalation is extremely complicated and transfer between chemically

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bound or salt form to free nicotine form can be extremely rapid.

So I think Claude's picture here, again consistent with his theory at the time, was really overly simplistic, so I don't agree with it the way it's said exactly.

Q. Is any part of that sentence accurate or is it just all wrong in your opinion?

A. Well, I think there is portions of it that are not explicit enough. The last phrase "relatively slowly absorbed," you know, I have looked for experiments published that demonstrate differences in absorption of nicotine and do not find any experiments in the published literature or in internal literature that demonstrate that changing pH affects absorption, the speed of absorption of nicotine.

MR. HOAG: Obviously it's getting close to 12:00 and I'm not done yet, so what do you need to do to get us another hour?

MR. LATHAM: How much more do you have, one hour?

MR. HOAG: Yeah, I would say I will try real hard to get done in an hour or more.

MR. LATHAM: I will call AT&T and get us another hour.

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(Off-the-record, brief recess.)

BY MR. HOAG:

Q. Okay, we took a small break to get some additional telephone time. Back on the same Exhibit No. 1, Roman numeral III, smoke pH and "free" nicotine.

In that first paragraph in the third sentence it says "As the smoke pH increases above about 6.0, an increasing proportion of the total smoke nicotine occurs in 'free' form, which is volatile, rapidly absorbed by the smoker, and believed to be instantly perceived as nicotine 'kick.'"

Let me break this down. Do you agree that as the smoke pH increases above about 6.0 an increasing proportion of the total smoke nicotine occurs in "free" form?

A. Technically that's quite reasonable, I think.

Q. And what is meant by the term free form?

A. The free form of nicotine would be the unbound form or the nicotine molecule itself not bound to an acid.

Q. The next part says "which is volatile." Do you agree that the free form is volatile?

A. In part. I think the free form of nicotine is also soluble in the particulate phase of smoke. So

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free nicotine or the free form of nicotine can exist both as solublized free nicotine in the particles. It can also exist as volatile gas phase nicotine.

Q. Do you agree that the free form is rapidly absorbed by the smoker?

A. As we talked about a few minutes ago, I think that's certainly a theory that a number of people have had. I'm not aware of any data that demonstrates that.

Q. You do agree that nicotine gets to the brain -- when it's inhaled in tobacco smoke, nicotine gets to the brain within a matter of seconds, correct, less than ten?

A. I think the absorption of nicotine in the human body is extremely rapid, within seconds.

Q. Do you agree that it's more rapid when it's in free form?

A. Well, I think again this is a far more complex subject as we know today than was thought even a few years ago. Certainly most of the nicotine I believe from -- I'm not an expert in biology, but from a number of studies that I have seen, it appears that, first of all, nicotine is absorbed rapidly and the retention of nicotine on inhalation by a human is virtually complete, that is, most all of the nicotine that's inhaled is

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retained. The only way that can happen given particle retention efficiencies that are quite low, is for the transfer mechanism to be through a vapor phase transfer mechanism. That process should be rapid.

Q. You keep talking about a vapor phase transfer mechanism to the brain.

A. No, from the parallel or the smoke, the parallel phase or from the smoke itself to the lung linings, so it's a vapor phase transfer mechanism primarily.

Q. How does it get to the brain?

A. Well, it must be absorbed at the lung lining and then the details of how it gets to the brain or any other part of the body is beyond me, frankly.

Q. You use the expression unbound form to describe free form?

A. Well, frankly, I use them interchangeably.

Q. What did you mean by unbound form?

A. Not bound to an acid, so it's the nicotine molecule itself not bound to any acid molecule.

Q. If it's not bound to any molecule and particularly an acid molecule, does that make it more rapidly -- facilitate the more rapid absorption of the nicotine?

A. Well, again that's a theory that some

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people have had. I'm not aware of any experiments that demonstrate that that makes it more rapid.

Q. In that same sentence he goes on to say that this is believed to be instantly perceived -- that the increase in nicotine in the free form is believed to be instantly perceived in nicotine kick. Do you agree with that?

A. I think this like the other phrase is a theory that several people have had. I don't think an increase in pH necessarily will increase any so-called nicotine kick. Again, because the -- of the smoke that's inhaled, virtually all the nicotine is retained by the smoker and that's absorbed extremely quickly.

Q. Do you believe there is under any circumstances a nicotine kick?

A. Well, how do you define nicotine kick?

Q. What's your understanding of how it's being used in this sentence written by Claude Teague?

A. Well, you have to understand that that would be just my interpretation. My interpretation would be nicotine pharmacology, perhaps.

Q. By nicotine pharmacology, what do you mean?

A. Some effects in the brain.

Q. So do you believe there is under certain circumstances a nicotine kick as you have defined it?

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A. Well, let me make this very specific. It's clear to me from extensive research that's been conducted outside Reynolds and inside Reynolds, that nicotine is pharmacologically active. There is a mild pharmacology associated with nicotine. I do know from those studies -- again, not being an expert in the area, it's clear that nicotine is pharmacologically active in the brain and other places in the body as well. I guess I forgot your question.

Q. Do you know -- it was about the nicotine kick, and I am assuming that this is your answer in response to the nicotine kick, whether or not there is a nicotine kick?

A. Well, yes, and I know that nicotine is pharmacologically active. There is a mild pharmacology, so that's how I would interpret a phrase nicotine kick. That would be my interpretation of this.

Q. So do you know specifically what nicotine does in the human brain?

A. No, I don't.

Q. Do you know whether it effects the dopamine level?

A. No, I don't.

Q. Do you know what dopamine is?

A. Yes. Didn't we cover this before?

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Q. I don't think we covered this document before.

A. I think we covered this issue as I recall.

Q. So as it relates to this issue, your recollection is you have answered questions about whether it affects dopamine and what dopamine is?

A. I have heard of dopamine. I am not a biologist. I don't understand mechanisms of dopamine in the human body so you are outside my area. I really don't understand.

Q. That would include serotonin, too, correct?

A. That's correct.

Q. Actually, that would include anything that the nicotine does in the brain related to any substance, not just dopamine and serotonin, correct?

A. I'm not a biologist. I think it's fair to say I don't understand biological mechanisms in a general sense between -- in nicotine and acting in the human brain, certainly.

Q. You also don't know what cocaine or heroin do to the human brain either, correct?

A. Biologically, absolutely not.

Q. The next paragraph of this page, the second sentence says, however, Marlboro smoke is typically a pH -- let me back up. The first sentence of the second

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paragraph says "Marlboro and Kool deliver about the same amounts of total smoke nicotine as do our comparable brand."

Do you agree at that time in 1973 Marlboro and Kool delivered about the same amount of total smoke nicotine as comparable brands from RJR?

A. I think that's generally my recollection. I am just turning to chart nine and ten and that's generally consistent with these charts. I think certainly there are some differences, but generally that's true.

Q. The next sentence says "However, Marlboro smoke is typically a pH 6.8 to 7.3. Kool smoke is typically a 6.4 to 6.6 as compared to Winston smoke at pH 5.8 to 6.0 and Salem smoke is 6.8 to 6.2."

Is that correct as far as that period around 1973 is concerned?

A. I believe those are numbers that he reported here for that time period.

Q. And he goes on to say that Marlboro and Kool smoke contain more "free" nicotine than our comparable brand. Do you agree with that conclusion?

A. Theoretically I think that makes sense. I think if one looks at smoke as a dilute aqueous solution, one would expect that. Cigarette smoke,

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however, is not a dilute aqueous solution, and I think extrapolating that to the amount of free nicotine is not correct.

In other words, if one takes a pH measurement and tries to calculate the level of free nicotine, I don't think one can really directly do that using chemical principles.

Q. And the sentence ends with the following statement, "hence would be expected to show more instantaneous nicotine 'kick' than our brand."

Do you agree or disagree with that?

A. I think this refers back to the theory about free nicotine -- increased free nicotine, increasing what Claude called nicotine kick. Again, this is a theory. I have never seen any research results that demonstrate that increased pH or increased free nicotine, in fact, would change the speed of absorption or the speed of physiological action.

So I don't know whether this is true or not. What we do know is that nicotine absorption is extremely rapid.

Q. Would it have to change the speed of absorption to change the amount of free nicotine that's available?

MR. LATHAM: Object to the form of the

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question.

THE WITNESS: It seems to me that's backwards. I think the theory that Claude is speaking to here is that if one somehow modifies smoke to increase free nicotine levels, that one would make the nicotine kick faster, to use his words.

BY MR. HOAG:

Q. Even if the nicotine kick is the same speed, whatever he is referring to with kick, even if that's at the same speed, if the amount of free nicotine is increased, in your opinion would that have any impact at all on the smoker?

A. No, because the total retention of nicotine by smokers is virtually complete, so that should have -- so the amount of free nicotine should not affect the total absorbed nicotine and if we assume that it doesn't affect the speed, then there is no difference.

Q. So if a cigarette has four-tenths of a milligram of nicotine and another cigarette has one-tenth of a milligram of nicotine, in your opinion is that going to affect how rapidly -- let me put it this way, is the one that has a full milligram of nicotine going to get to the brain in your opinion more rapidly than the one that has four-tenths of a milligram?

A. Let's see, if you are asking does the

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nicotine level in the smoke affect speed of absorption, I am not aware of any data that suggests that at all.

Q. Does the amount of nicotine in the cigarette affect anything as far as the smoker is concerned?

MR. LATHAM: Object to the form of the question.

BY MR. HOAG:

Q. In your opinion?

A. Well, in my opinion, certainly because the retention efficiency of nicotine on inhalation is virtually complete, a higher tar and nicotine cigarette smoked by the smoker should give more nicotine absorption compared to a lower tar to nicotine cigarette.

Q. Would it be more nicotine to absorb, but it wouldn't get to the brain any quicker, right?

A. There would be more nicotine to absorb. You would expect more nicotine to be absorbed, but again, I have seen no data that shows any differences in rate of absorption. The rate of nicotine absorption is extremely fast.

Q. Moving to the third paragraph of Roman numeral III, it says "As a result of this higher smoke pH, the current Marlboro, despite a two-thirds reduction

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in smoke, 'tar' and nicotine over the years, calculates to have essentially the same amount of free nicotine as smoked as the early Winston." Do you agree with that?

A. Well, I think I agree in the sense that Claude could go through these calculations. I disagree over the meaningfulness of calculated free nicotine levels, which he obviously did from pH measurements, and so overall, I don't agree with that statement.

Q. Assuming, for example, that there was a two-thirds reduction in nicotine over the years from Marlboro, that the Marlboro went from one point something or other milligrams down to .6 milligrams of nicotine, is he saying here that the actual amount of unbound nicotine that gets to the smoker is essentially the same as the amount that the smoker had when it was over one full milligram of nicotine in the cigarette?

A. Well, I think my interpretation of this sentence would be that that is what he is suggesting, that the amount of unbound nicotine is essentially the same amount, even though the nicotine level had gone down. I think that's what Claude is suggesting here in his theory.

Q. That's because what he is saying is if you raise the pH level you get more of that unbound nicotine, right?

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A. I think that's an important element of his theory here, that's right.

Q. He goes on to say in the bottom of that paragraph "Currently the calculated amount of 'free' nicotine in Marlboro smoke is almost three times the amount in Winston smoke."

Do you agree with that statement as it applies to 1973?

A. Well, I agree in the sense that Claude probably calculated numbers that he called free nicotine based on measured pH. I don't dispute that at all. I do disagree over the meaningfulness of any calculated free nicotine number because I don't think that one can do that from chemical principles using pH data for a material like smoke which is not a dilute aqueous solution.

Q. In Roman Neumann IV, the sub-head is smoke pH and other smoke qualities. He is saying that in the first sentence "In addition to enhancing nicotine 'kick', increasing the pH (increasing alkalinity) of smoke above about 6.0 causes other changes, particularly when the increase in smoke pH is achieved by adding ammonia to the blend."

Do you agree with him that adding ammonia to the blend causes other changes even if you don't

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agree with him that it enhances the nicotine kick?

A. I do agree that adding ammonia to various tobaccos causes a number of changes, not -- at the levels we use in commercial products not changes to pH or certainly not to free nicotine, but adding ammonia to tobaccos does cause a number of changes to the taste of smoke from those tobaccos.

Q. The next sentence he says "As smoke pH increases, in general stemmy taste, mouth irritation, flue-cured flavor and Turkish flavor are diminished, and burley flavor and characters are enhanced."

Do you agree with any part of that sentence?

A. Yes, I agree that there are major changes in the taste characteristics when one ammoniates tobaccos. We have already talked earlier about how ammoniation particularly at very high levels of ammoniation, much higher than we use in commercial products, can affect mouth irritation or oral sensation of the smoke.

Q. So these things that he mentions, general stemmy taste, mouth irritation, flue-cured flavor, do you agree that those are things that the ammoniation has an affect on?

A. Well, the terms stemmy taste, flue-cured

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flavor, Turkish flavor and burley flavor are certainly dependent on the individual definitions that individuals may have about what constitute those attributes.

I do agree that there are major differences on ammoniation in a number of taste attributes that result probably from a variety of chemical reactions between ammonia and compounds in tobacco to form very flavorful compounds, particularly a class of compounds we call pyrazines.

So ammonia undergoes a number of reactions and forms flavorful compounds that some people certainly may interpret as some of these attributes that Claude talked about.

Q. The last -- next to the last sentence in Roman numeral IV on that page says "It should be noted, however, that if the smoke pH goes much above 7 at normal total smoke nicotine levels" -- there is some additional measurements -- "the amount of 'free' nicotine becomes high, and this may cause harshness to the throat."

Do you agree with that in meaning that if the smoke pH goes above seven at normal total smoke nicotine levels, it's going to cause harshness to the throat?

A. I think if one does something to the

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cigarette, such as adding very large quantities of ammonia to increase pH much above seven, that will create a very harsh smoke. For example, cigar smoke has a pH much above seven and it is a very harsh smoke. Most people do not, cannot, will not inhale it.

Q. In the next page of the document in the last paragraph under marketing correlations and implications -- do you see that last paragraph?

A. Yes.

Q. It says "Subsequent detailed analysis by marketing research of our pH and 'free' nicotine data along with sales data and other factors has confirmed the strongly positive correlation between 'free' nicotine in smoke (determined by pH and total nicotine in smoke) and market share performance."

Do you agree that they did do a detailed analysis to come up with this correlation in 1973?

A. I agree that there was an analysis of the data. I agree that this was one of the conclusions. I don't agree with that conclusion, however.

Q. In Roman numeral VI, under present RJR brand activity, in the second sentence he says "There is evidence that other brands which are selling well also have some of these attributes, particularly increased 'free' nicotine impact." New sentence, "Because brands

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of the new type continue to show vigorous growth in sales; because of a high proportion of beginning smokers are learning to like Marlboro, the leading brand of the new type; and because we have no current brand in this newly identified, major segment of the market; it has become appropriate for us to consider moving our present brands in the direction of the new type of cigarette and/or creating new products to compete directly in that area of the market." That's the end of the statement.

You have previously said in your testimony that it's your understanding that RJR did, in fact, begin to add ammonia to some of its brands of cigarettes just one year later in 1974, correct?

A. I think I testified that Camel was the first RJR product to use ammoniated reconstituted tobacco in 1974.

Q. And then your leading brand of Winston was added in 1979?

A. That's correct.

Q. Do you agree with him that a high proportion of beginning smokers are learning to like Marlboro?

A. Well, I think in a general sense my review of information certainly suggests that younger adult smokers tend to prefer Marlboro. I don't know about

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beginning smokers.

Q. Most beginning smokers are not adults at all, is that correct?

A. I don't know that at all.

Q. Have you ever seen any marketing research or memorandums including those from Claude Teague indicating that most beginning smokers are not adults?

A. You know, I have seen bits and pieces of different types of information that certainly suggests that some underage people begin to smoke while they are underage. The proportion of that, in fact, I don't really know. So I don't know how else to answer your question because I don't have specifics in my head.

Q. You don't know whether the majority of smokers begin to smoke regularly before the age of 18?

A. I don't know that one way or the other.

Q. Do you know whether or not Claude Teague knew the answer to that question when he wrote this memo?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I really don't know what Claude knew at that point.

BY MR. HOAG:

Q. Other than he had the opinion that a high

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proportion of beginning smokers are learning to like Marlboro, right?

A. What he says is a high proportion of beginning smokers are learning to like Marlboro. He doesn't say those beginning smokers are underage as you are suggesting.

Q. He doesn't say that in this document, I agree.

A. That's right.

Q. The next page, which is four at the top and last four page numbers, bates stamps are 3468, Roman numeral VII, says research activities, current and planned. Do you see that?

A. Yes.

Q. The second paragraph says "Methods which may be used to increase smoke pH and/or nicotine 'kick' include: (1) increasing the amount of (strong) burley in the blend." Do you agree that's one way to do that?

A. If one makes a cigarette of 100 percent burley, one finds that the pH measurement is higher, so in a general sense I agree with that.

Q. So the higher the percentage of burley, the higher the pH level, as a general rule?

A. Well, again it's a matter of degree. If one makes 100 percent burley cigarette, first of all,

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that's unsmokable by the consumer or American consumers don't like that, but that will, if you measure pH, show a higher pH number.

Q. He is not suggesting here that production of 100 percent burley cigarette by saying increasing the amount of burley in the blend, is he?

A. I don't think that's what he is suggesting either, but I do think that it takes a lot of change in the burley composition in the blend to significantly affect pH to the point where you really have a different measured pH.

Q. But you don't have to put 100 percent to change the pH, right?

A. I would suppose not. Going to 80 percent burley, for example, and 20 percent flue-cured would probably show a different pH compared to a 20 percent burley, 80 percent flue-cured cigarette.

Q. But if you went to 70/30, it wouldn't?

A. I'm sorry, I didn't understand.

Q. If you went to a 70/30 split, 70 percent burley, it would not show an increase?

A. Compared to an 80/20?

Q. No, I'm not saying compared to an 80/20. If you took a 70 percent burley --

A. Right.

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Q. Would that increase the pH over something that didn't have any percent burley?

A. Yes, I think it probably would.

Q. And that would be true as you keep going down the percentages, right?

A. Yeah, all those small changes, I think probably wouldn't be measurable -- you wouldn't see measurable differences given the analytical techniques that are available.

Q. When you say you wouldn't see measurable differences, what do you mean?

A. We were talking earlier about variability in the test method, that the pH measurement is good -- is no better than plus or minus a couple tenths of a pH unit, and we know that from repeated measures of the same sample of cigarette over and over and over. So all I'm saying is that to really see a difference that's probably beyond the variability in the method, one would need to change burley levels to a fairly large degree.

Q. How large a degree are you talking about when you say "fairly large degree"?

A. Well, I chose one example that I would guess would show a measurable difference and that's 80/20 versus 20/80 burley to flue-cured and that's just my best guess based on some experimental research

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results that I reviewed in the 1970, 1980 time frame.

Q. So to get measurable differences if you went anything below that 80/20, with 80 meaning burley, you wouldn't see measurable differences, is that your opinion?

MR. LATHAM: Object to the form of the question.

THE WITNESS: All I'm saying is that if the differences in burley percent and a blend is relatively small, you are not going to see differences that you can say are real differences given the variability in the test method. I feel comfortable saying, however, if there are large differences in burley content that you probably would see pH difference -- pH number differences that are large enough to where I would feel comfortable saying they were really different.

BY MR. HOAG:

Q. Based on your definition of really different, is 70/30 a large enough split or would that be too small?

A. Compared to no burley? I'm sorry, compared to what?

Q. To get a measurable difference that's really there in the pH.

A. Comparing 70 percent burley versus what?

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Q. What's the split now on brand cigarettes? What's the most burley used in any brand of cigarette?

A. Typically in commercial products today on the market burley is on the order of I would say 30 to 40 percent of the blend, and that's just a ball park figure.

Q. 30 would be the minimum and 40 percent would be the maximum for any blend?

A. I say that's a typical range in the commercial market today. You may find some that are slightly below that range. You may find a few brands slightly above that. I'm just giving you a typical range of burley content.

Q. If you raised it to 50 percent, would there be any measurable difference in pH that was there?

A. I wouldn't expect a measurable difference, no.

Q. How about if you raised it to 60 percent?

A. Probably not.

Q. How about if you raised it to 70 percent?

A. Well, if you are asking me to guess, I might guess that we might start seeing a measurable difference. If you went up to 70 or 80 percent burley compared to, say, 30 percent burley, you might start seeing a difference there in the measurement itself.

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Q. Of pH?
A. Yes.
Q. Just using the burley could create that, the burley by itself?
A. By increasing the burley level substantially in the blend I think it's fair to assume that you will see an increase in pH if the change in burley is large enough.
Q. What if you increase the burley to 50 percent and also added ammonia?
A. I don't know. I would have to do the experiment. I have not done that, I don't think.
Q. The next method to increase smoke pH where he is talking about and he also says nicotine kick would be "reduction of casing sugar used on the burley and/or blend." Do you agree that could increase the smoke pH reduction of casing sugar used on the burley and/or blend?
A. In a general sense I think that's correct.
Q. Do you know whether or not that's done to increase smoke pH to anything at all in smoke, for example, add to the impact of the cigarette?
A. Yes, I know.
Q. Is it?
A. No.

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Q. Ever?

A. I'm not aware of any case where that's been done.

Q. The next thing he says the "use of alkaline additives, usually ammonia compounds, to the blend." Do you agree that can increase pH?

A. In a general sense I agree if the level of ammonia compounds that are added is large. At the levels that we use in commercial production, the ammonia is not there or the added ammonia is not there in sufficient quantities to cause a measurable difference in pH.

Q. Is that because in your opinion a measurable difference in the kick from the nicotine as you described it?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I'm sorry, I didn't understand that.

BY MR. HOAG:

Q. Does it, in your opinion, cause a measurable difference in the kick from nicotine as you defined the term kick?

MR. LATHAM: Object to the form of the question.

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THE WITNESS: No, it doesn't.

BY MR. HOAG:

Q. And he also includes here addition of nicotine to the blend. Do you agree that an addition of nicotine to the blend would increase smoke pH?

A. Yes.

Q. Why is that?

A. Because nicotine is a base and if one adds bases the pH will be higher. If one adds acids the pH will be lower.

Q. And ammonia is a base, too?

A. Ammonia is a base as well.

Q. And he mentions removal of acid from the blend. Do you agree with that, removal of acids from the blend would increase smoke pH?

A. I think that makes sense to me.

Q. Has that been done?

A. Not that I'm aware of, no.

Q. Do you know whether or not acids have been added to the filter to decrease pH and/or alkaloid levels?

A. I'm aware of some experiments where that's been tried.

Q. Do you know if it's ever been used?

A. Commercially I'm not aware of any case that

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that's been used.

Q. What experiments are you aware of?

A. Let me give probably the best example that comes to mind right away, and that's the development of medium nicotine, low tar products and that was an experimental project that we conducted at Reynolds to try to reduce tar levels while maintaining nicotine levels at the current level.

We found that as I said earlier this morning, that if the tar-to-nicotine ratio is slightly different, either high or low, those products are not consumer acceptable. In this experiment or in this project, we found, in fact, those products not to be consumer acceptable. So one theory was that adding acids either to the tobacco or to the filter would make the smoke less harsh, less irritating and more acceptable to the smoker.

Those experiments didn't result in consumer acceptable products either.

Q. The sixth thing he mentioned to increase pH is "special filter systems to remove acids from or add alkaline materials to the smoke." Is that what you are referring to now?

MR. LATHAM: Object to the form of the question.

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THE WITNESS: Yes. And in the example I was using it was to add acids to the smoke.

BY MR. HOAG:

Q. You add or remove?

A. In the experiment I was describing we were adding acids.

Q. Are you familiar with any experiments where acids were removed?

A. I am aware of a couple experiments that have been attempted in the past. I think those were unsuccessful.

Q. Are you aware of any experiments where alkaline materials were added to the smoke?

A. Yeah, I'm aware of some experimental attempts at that, yes, but not commercially.

Q. The seventh thing he mentioned to increase smoke pH in our nicotine kick is using higher air dilution systems.

MR. LATHAM: Object to the form of the question.

BY MR. HOAG:

Q. Do you agree that would be a method of increasing the smoke pH?

A. I agree that high levels of air dilution results in slightly higher smoke pH numbers.

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Q. How does one go about doing that?

A. How does one do what?

Q. High air dilution.

A. I think Claude here is referring to filter air dilution.

Q. High air dilution filter systems, right?

A. Yes. So a filter air dilution system is essentially a filter where vents or holes or perforations have been placed in the filter to admit fresh air so that a portion of what goes in the smoker's mouth is fresh air and not smoke. So it's a way of diluting the smoke to achieve lower tar and nicotine yields.

Q. Is that a way to achieve higher pH?

A. Well, if one compares a low or no diluted cigarette to a highly air diluted cigarette, the observation is that the highly air diluted cigarette smoke pH is slightly higher. That turns out to be a good example of the artifact or the artificial nature of the pH measurement itself.

Q. Has the high air dilution cigarette system ever been used in a commercial product?

A. Yes.

Q. Which one or ones?

A. There is quite a variety. Most cigarettes

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on the market today use filter air dilution and the lower the tar level the higher the filter air dilution level is used.

Q. To the extent that if human lips cover up those holes in the filter that would change the result, is that correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Well, to the extent that a smoker may block the vents on a filter, that would result in an increased tar and nicotine yield to the smoker compared to the case where they are completely unblocked.

BY MR. HOAG:

Q. The last sentence says "Methods 1-3, in combination, represent the Philip Morris approach, and are under active investigation."

Do you know whether or not that's true or not?

A. Which part, that it represents the Philip Morris approach or that it's under active investigation?

Q. Let's start with the approach part first and break it down.

A. I think my belief is that certainly number three, the use of ammonia compounds -- Marlboro did use

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ammoniated tobaccos at that time period. I'm not aware of any evidence that, number one, increased amount of burley in the Marlboro blend was, in fact, correct. In fact, I believe it not to be correct. Reduction of casing sugar on the burley, I also believe not to be correct.

So of those three, I believe only one, and that's item number three, probably holds.

MR. HOAG: Now I would like to have marked -- and it's going to be the last exhibit I'm going to use. I know there is only five or ten minutes left. Is what's been marked as -- it's bates stamped number 50689 4621 and 4622. It's a letter to Dr. Young from C. Everett Koop.

(Exhibit No. 2 marked for identification.)

BY MR. HOAG:

Q. Okay, now Plaintiffs' Exhibit No. 2, have you ever seen that before?

A. Yes.

Q. When did you first see that?

A. I would say probably four or five years ago.

Q. And where was this located? Was it in your files? Was it in the library?

A. I have had a copy of this in my files for

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several years. I don't recall exactly where I got it, but it's in my files presently.

Q. You don't recall whether someone gave it to you or how you got it, is that right?

A. I really don't, but I have a copy of this in my files. It's been there for quite sometime.

Q. In this particular letter from -- before I go to that, how did it come to be in your files? Why did you put it in your files, I guess is what I want to know?

A. Well, that's a good question actually. I have a lot of documents in my files that relate to the development of Premier and Eclipse. I have a large number of letters to Frank Young who was then commissioner of FDA, petitioning the FDA to take action on Premier. I have a large collection of a variety of letters from not only in this case, Surgeon General Koop, but also from various state public health officials, pharmacy boards and a variety of other people.

So I just have a large stack of information because it pertains to the events that were surrounding the Premier development.

Q. Referring to product health claims are implicit, which is at the bottom of the first page of

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this document, it says "In its public statements and marketing plans, RJR states regarding the product: 'a majority of the compounds produced by burning tobacco are eliminated or greatly reduced, including most compounds that are often associated with the smoking and health controversy.'"

Is that true that RJR in a public statement had stated that?

A. I think that's a fair statement.

Q. Now he goes on to say, and I'm quoting him now, "To me, this suggests a health claim that the product is 'safe' or 'safer' than conventional products, which could result in reduced quitting by smokers, increased relapse by ex-smokers and increased initiation by adolescents."

Do you agree that by suggesting that the product is safe or safer than conventional products it could result in reduced quitting by smokers?

A. Let me first say that I don't think the statement that's in quotes and attributed to RJR says or necessarily even implies that that product is safe or safer. I think the statement that's in quotes, in fact, says what it is, that there is reduced levels of compounds.

If one takes Koop's conclusion that that

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does result in an implied health claim, I find it very difficult to believe that would lead to an increased initiation by adolescents.

Q. But you do find it something that you would accept that it could result in reduced quitting by smokers?

A. Well, I really don't know to what extent that may or may not happen. I just have no idea. Again, I think the statement that's in quotes is what it is. Whether or not that conveys to smokers an implied health claim, I can't really say. I really have no idea.

Q. Do you agree that a health claim that the product is safe or safer -- I understand your comment about you not agreeing about the health claim -- do you agree that a health claim that does that, that implies a product is safe or safer than conventional products could result in increased relapse by ex-smokers?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I think if a cigarette explicitly claimed that it was safe or safer, it's easy for me qualitatively to suspect that some ex-smokers may start smoking again. To the extent that that may happen, I have no idea, but it's easier for me to

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imagine that it may to some degree.

BY MR. HOAG:

Q. Why is it not easier for you to believe that it would result in increased initiation by adolescents?

A. Because, and this is just my personal opinion so take that for what it is, I think smokers who or people who are concerned about their health tend to be older smokers, and I think even young adult smokers, adult smokers but are young, are less concerned about their health. So again, this is my opinion. It's hard for me to imagine that even an explicit claim of safe or safer would necessarily appeal to young adult smokers.

Q. Do you agree that adolescents who begin to smoke generally believe they can quit any time they want to?

MR. LATHAM: Object to the form of the question.

THE WITNESS: Well, I don't know. I have never done a survey of that sort and I have never -- actually I don't recall seeing surveys of that sort or results of surveys like that. I think certainly and this is my opinion only, I think there probably are not only young adult smokers, but probably even underaged smokers who probably believe that. The degree of it, I

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have no idea.

BY MR. HOAG:

Q. Another sub-head of this page one of Plaintiffs' Exhibit No. 2 says nicotine is an addicting drug. "The RJR data indicated its new device is an effective nicotine delivery system, capable of sustaining nicotine tolerances and physical dependence due to tobacco use."

Do you agree the RJR data indicated that the new device meaning the Premier product is an effective nicotine delivery system?

A. No, I don't agree with that at all. I think the RJR data clearly showed that it was a cigarette that reduced levels of constituents in smoke dramatically, including nicotine but especially those constituents in smoke that are of health concern.

Q. Premier made sure that -- the people developing the Premier product made sure it contained enough nicotine to keep people smoking the product, correct?

MR. LATHAM: Object to the form of the question.

THE WITNESS: I think your question implies that we know what that level needs to be and we don't. What we do know is that cigarettes with extremely low

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levels of nicotine relative to tar are not acceptable.

This cigarette was designed with tobacco which delivered nicotine and tar, but just with very reduced levels of certain constituents in the smoke. To suggest that we had some magic nicotine target I think is a mistake.

BY MR. HOAG:

Q. Do you know whether or not the cigarette industry and/or RJR has ever done any research on what the minimal level of nicotine would be for consumers of cigarettes?

A. I think there has been some research along those lines, but I think it's inconclusive, at least what I have seen, because I think there is a wide variety of personal preferences in the marketplace. Some people like and routinely purchase low tar, low nicotine cigarettes. Some people purchase high tar, higher nicotine cigarettes. So I know there has been some research along those lines and I don't think it's been conclusive, and I certainly don't think that it's defined any kind of lower threshold or target for nicotine delivery.

Q. Have you reviewed all -- have you made a systematic review of that type of research within the internal documents for RJR?

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A. On nicotine thresholds or minimum nicotine level?

Q. Yes.

A. No, I haven't made a systematic and complete review of research in that area. I have seen some of it, however.

MR. HOAG: I don't have any other questions. Thank you very much for your time. I am ordering the transcript, Min-U-Script and disk, and I guess that's it.

THE WITNESS: Thank you.

(Signature reserved.)

(Whereupon, at 1:05 p.m., the taking of the instant deposition ceased.)

_____

Signature of the Witness

SUBSCRIBED and SWORN TO before me this _____ day of _____, 19___.

_____

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My Commission expires: _____

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E R R A T A S H E E T

RE: HOWARD A. ENGLE, M.D., ET AL. V. RJ REYNOLDS TOBACCO COMPANY, ET AL.

DEPOSITION OF: DAVID E. TOWNSEND, PH.D.

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CERTIFICATE OF REPORTER

STATE OF NORTH CAROLINA)

COUNTY OF MECKLENBURG)

I, Andrea L. Nobrega, the officer before whom the foregoing deposition was taken, do hereby certify that the witness whose testimony appears in the foregoing deposition was duly sworn by me; that the testimony of said witness was taken by me to the best of my ability and thereafter reduced to typewriting under my direction; that I am neither counsel for, related to, nor employed by any of the parties to the action in which this deposition was taken, and further that I am not a relative or employee of any attorney or counsel employed by the parties thereto, nor financially or otherwise interested in the outcome of the action.

Andrea L. Nobrega

ANDREA L. NOBREGA
Court Reporter and Notary
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